Chapter 2: Statewide Karner Blue Butterfly Habitat Conservation Plan (HCP)

D. Implementation with Adaptive Management

This part of Chapter II discusses the use of adaptive management by the HCP partners. It is broken into four main sections:

- What Adaptive Management Is
- Surveying and Monitoring Procedures
- Assessment of Conservation Measures, through Auditing
- Research

1. What Adaptive Management Is

Adaptive management can be defined as a formal, structured approach to dealing with uncertainty in natural resources management, using the experience of management and the results of research as an on-going feedback loop for continuous improvement. Adaptive approaches to management recognize that the answers to all management questions are not known and that the information necessary to formulate answers is often unavailable. Adaptive management also includes, by definition, a commitment to change management practices when determined appropriate.

There are a variety of approaches to adaptive management. One approach relies on modeling as a predictive tool. In this approach, a modeler takes what is known about how a system theoretically functions, uses available empirical data to quantify system components and processes, and develops a management model to be implemented on the landscape. The model predicts the consequences of management practices and other activities. Monitoring and research are used to either validate or invalidate the model. If the model prediction proves to be inaccurate, the modeler alters the model or develops a new model using the new knowledge and again tests it to the landscape. However, if the model is validated and management practices result in an undesirable effect, the practices are altered based on the model output.

A different approach to adaptive management relies on the management activities and practices that are already in place and for which there is no existing data or obvious reasons that suggest a need for change. This approach allows for up front management changes during routine operations as management practices are implemented on the landscape. However, under this

approach, carefully-designed monitoring and research procedures are initiated to determine if there are any effects of the management practices. As new information becomes available (e.g., biological information for the species or implications of habitat management), these new findings are incorporated into the implementation plans of partners. If findings from these efforts substantiate a need for change, managers make appropriate changes reflective of the knowledge gained from monitoring and research.

Only the second approach to adaptive management will be applied in this HCP. The starting points for this HCP are the management categories "Management with Consideration" and "Management to Feature, Protect and Enhance" described in Part C of Chapter II (pages 63-67). These broad management categories are intended to communicate landowner goals and objectives (e.g., the integration of Karner blue butterflies into land management activities or the featuring of Karner blue butterflies in land management activities). A variety of more specific conservation measures have been crafted to better explain how these management categories will be achieved at the landscape scale, within and across ownerships (e.g., shifting mosaic, long-term maintenance, etc.). More specific management activities (forest management, barrens management, etc.) explain what types of on-the-ground efforts will occur consistent with the HCP and conservation agreements. The adaptive management approach taken here begins with these management approaches and activities, recognizing that partners will implement their activities as described in the HCP and conservation agreements.

Implementation of adaptive management, regardless of the approach taken, relies on monitoring and research findings, as well as the identification of appropriate "trigger points" for changing management practices. This chapter discusses how monitoring, research and trigger points for change will be used by the HCP partners.

2. Surveying and Monitoring Procedures

A Monitoring Team was charged with the task of determining surveying and monitoring procedures for the implementation of the HCP. This team served an advisory role to the HCP partners based on the biological expertise of its members and their survey experience with the Karner blue butterfly. The team consisted of members from all partner groups, as well as experts from outside the HCP team.

Monitoring will be used to determine both the success of the partners at meeting their individual conservation agreement goals and of the HCP at meeting its statewide conservation goals. Accordingly, two types of monitoring will be conducted for the HCP: (a) self-monitoring and (b) effectiveness monitoring. Self-monitoring will be performed by each partner at its discretion, but consistent with this HCP and the partners' conservation agreements; effectiveness monitoring is an agreed upon formal protocol for detecting large scale trends across all partners' lands

combined. All partners will contribute to the monitoring effort, although the two types of monitoring are exclusive in that effectiveness monitoring will not satisfy the requirements for self-monitoring and vice-versa.

Effective monitoring is critical to the success of this HCP. Although it is an important component of any conservation effort, an adaptive management approach hinges on proper monitoring. Adaptive management offers the potential for partners of the HCP to have the flexibility necessary to meet their respective goals and for the Karner blue butterfly to have the dynamic landscape necessary to maintain viable populations. Part C of Chapter II (pages 61-62) outlines the approach to measuring conservation taken in this HCP. Because of the need for this HCP to be flexible for management, responsive to monitoring results and honor legal obligations, a statewide monitoring program is a necessity.

a) Self-Monitoring

Self-monitoring is an indispensable means for a partner to integrate surveys and record keeping with their unique management practices. There is not a single designated protocol. Some partners may choose to follow methods already adopted and outlined in their conservation agreements. Other partners will choose to apply protocols described in "Wildlife Management Guidelines for the Karner Blue Butterfly" included in Appendix F. An additional protocol which may be applied in self-monitoring is the Karner blue butterfly relative abundance monitoring protocol currently being developed for use in effectiveness monitoring (see below). Although self-monitoring practices may differ by individual partners, the following elements must be included in all protocols when applicable:

- Use of partner data and records maintained for lupine and/or Karner blue butterfly presence.

- Records of areas or dispersal corridors of lupine/Karner blue butterfly habitat presence and abundance.

- Periodic monitoring during the period of the permit, consistent with the HCP and incidental take permit, to determine changing conditions of discovered and recorded lupine or Karner blue butterfly habitat on partner land.

- Post treatment monitoring, consistent with the HCP and incidental take permit, to assess any impacts of the treatment or conservation measures on the Karner blue butterfly.

Some partners have outlined in their individual conservation agreements specific types of monitoring they will conduct to determine the effects of their activities on the Karner blue butterfly. Typically, considerations for the Karner blue butterfly will be incorporated before

management activities occur and impacts of that management action will then be evaluated through observation during the ITP period. Such activities and impacts will be documented and these records will be used as needed by the partners for annual reports to, and auditing by, the DNR and the USFWS as part of the adaptive management process.

Partners will develop a self-monitoring process that includes post-monitoring efforts and applies to those partners that have not specified a self-monitoring protocol in their conservation agreements. Over time, guidelines and protocols that outline an optimum monitoring timeframe for a particular land management activity will be derived from experience. For example, partners may develop timing and duration guidelines for monitoring to verify presence of lupine following the clearcut of a timber stand. Applying such empirical knowledge would increase the efficiency of partner efforts, as well as encourage information exchange. The DNR will be responsible for facilitating the development of the self-monitoring process.

Habitat evaluation similar to that developed by Bidwell (1996) may be appropriate for self-monitoring. Habitat evaluation would be valuable when a decline is detected, helping to determine the cause as related to habitat parameters. While habitat evaluations may provide useful insights to individual partners about the impacts of land management activities, the results of this evaluation cannot be incorporated into the broader effectiveness monitoring unless a large sample is surveyed. The sample size required to obtain statistically valid baseline data, however, would be too large as to be practical for the partnership.

b) Effectiveness Monitoring

Effectiveness monitoring is critical to the overall success of the HCP. Although effectiveness monitoring is an important component of any conservation effort, the adaptive management approach hinges on it. Because of the need for this HCP to be flexible for management, responsive to monitoring results and honor its legal obligations, a formal effectiveness monitoring program was developed.

The monitoring protocol to assess the statewide effectiveness of the HCP has been in the development process for over two years. In early 1995, the HCP monitoring team drew on expertise of Wisconsin land managers and biologists with experience monitoring Karner blue butterflies and developed a protocol for monitoring the occurrence of lupine habitat and Karner blue butterflies on sites within the high potential range. The problem of detection of population trends, however, spawned a study by University of Wisconsin-Stevens Point researchers to analyze transect methods and develop a biologically sound method to evaluate changes in butterfly relative abundance (Brown and Boyce 1996, 1998). A suggested protocol developed as a result of this study (Brown and Boyce 1996) presented some practical difficulties given the limited resources that many of the partners have to apply to the demands of effectiveness monitoring on their lands. With the assistance of DNR and forest industry statisticians and U.S. Geological Survey biologists, development of a refined protocol has continued to evolve, as the monitoring team addresses issues involved with the task of monitoring butterfly relative abundance on diverse sites across the state.

The purpose of HCP effectiveness monitoring is to provide, as economically as possible, a

biologically sound means of detecting statewide trends of Karner blue butterfly habitat, presence/absence and relative abundance. Trends in these variables profile the overall condition of the species in Wisconsin. Consequently, this information is necessary to assess the efficacy of the HCP. Effectiveness monitoring will take place on partner lands in the high potential range.

Sites Eligible for Effectiveness Monitoring Sampling. Sites will be randomly selected from a pool of sites for survey. If determined to be necessary in order to ascertain population trends, some sites may be later selected for continuous monitoring. The eligible pool of survey sites is within the Karner blue butterfly's high potential range (Fig. 2.9, page 54) and will vary according to conservation strategy.

In order to be within the survey pool, a site must meet the following criteria:

- A site must be within the High Potential Range: the region of the state containing the documented range and areas with similar habitat, soils and climate, where the Karner blue butterfly is most likely to occur (see Figure 2.9, page 54).

- A site must be part of the lands included in the HCP and associated conservation efforts: sites defined in individual partner conservation agreements as lands that are included in the conservation strategies "Management for Consideration" and/or "Management to Feature or Enhance."

- A site must have either shifting mosaic or long-term potential habitat: Shifting mosaic potential habitat is defined as sites within the high potential range that are owned by partners engaging in shifting mosaic strategy and have the potential (soils, canopy cover, etc.) to support lupine. Long-term potential habitat is defined as sites within the high potential range that are owned by partners engaged in maintaining permanent habitat and that have lupine present.

For those sites that are managed as a shifting mosaic, the sample pool will be those areas that have the potential to support lupine (i.e. potential habitat); for those sites that are primarily in long-term management, the pool will be from known lupine sites (i.e. known habitat). Partners in the long-term habitat sample group will, over the next three to five years, inventory currently known lupine sites. New sites would also be added to the pool as they are identified. Lands would be surveyed again for change, providing a quantitative index of lupine for this sample group.

Survey Protocol. Consistency in data collection is necessary in order to develop an accurate assessment of trends of the Karner blue butterfly and its habitat. Accordingly, survey for effectiveness monitoring will follow a common protocol, as specified in the HCP monitoring

protocol included in Appendix G. In general, the same protocol for lupine survey will be used across the partnership; for occupancy and abundance, however, the survey protocol will differ between conservation strategies, but not among partners within the same strategy.

Partners have agreed that a measure of Karner blue butterfly habitat (lupine), occupancy and relative abundance should be examined to form the basis for adaptive management and action triggers. Sampling for these factors will use the lupine surveys as the base layer, with occupancy and abundance sampled on identified lupine sites.

Sites Designated for Sampling for Presence of Habitat (Lupine). For habitat survey, the presence of lupine will be determined and its abundance broadly quantified. This will require one visit to each site, with observers walking systematically located transects. Survey walks are best conducted in late May through mid-June. See the HCP protocol for conducting lupine surveys contained in Appendix G.

Lupine sampling will likely only need to be conducted on new sites for long-term habitat and sites replacing those lost to succession for shifting mosaic habitat. On previously sampled sites, lupine surveys would likely only need to be repeated over a period of years.

Sites Selected for Butterfly Presence/Absence. For occupancy survey, the presence of the Karner blue butterfly on a particular site will be determined. Presence may be determined during first or second flight, but absence must be verified during second flight. If the Karner blue butterfly is not detected on the initial visit, two more visits are required to verify absence. Under the proper weather conditions, at least two of the three surveys must occur four to eight days apart during the second flight in early July to late August (aiming for peak flight). Once presence is established, no more visits are necessary. For more detailed information, see the HCP's Karner blue butterfly survey protocol for conducting presence/absence surveys contained in Appendix G).

Sites Selected for Butterfly Relative Abundance. For relative abundance survey, an index of abundance of Karner blue butterflies on the survey site will be determined. As with presence/ absence, at least two surveys must occur under appropriate weather conditions during the second flight over six days apart (aiming for peak flight). Under proper weather conditions, one or more observers will walk parallel line transects across the Karner blue butterfly habitat on the site, count butterflies observed and record necessary information. Details will include the time and date it was conducted, the distance walked and the number of Karner blue individuals counted. The HCP's relative abundance survey protocol is contained in Appendix G).

Sample Size, Distribution and Stratification. Analysis of existing Karner blue butterfly monitoring data was conducted to determine the appropriate number of sites to annually monitor in order to detect trends over time. From analyzing data (P. Rasmussen and M. Boyce, pers. comm.), it was determined that approximately 100 sites, the size of which is determined in the monitoring protocol, monitored annually for Karner blue butterfly occupancy would be sufficient to detect trends over a 10-year period. Ten years is preferable to a shorter timeframe because a shorter monitoring program is apt to detect only large decreases in stand occupancy (five to ten percent per year with a five year strategy), with a likely 200 sites monitored each year necessary. Alternatively, a 10-year monitoring program of 100 to 200 sites is likely to detect annual changes of five percent and in some cases two percent in stand occupancy. Annual percent changes in stand occupancy differ from that of annual percent changes in stand indices; in order to decrease occupancy by one stand, many individuals must be eliminated.

Sampling will be distributed across the partnership between the two major types of conservation strategies as follows:

Shifting Mosaic Potential Habitat:

1) 200 sites surveyed for the presence/absence of lupine.

2) 100 sites surveyed for the presence/absence of the Karner blue butterfly.

3) 50 sites surveyed for Karner blue butterfly relative abundance.

In summary, 200 potential sites will be randomly surveyed for lupine presence. Of those sites that have lupine, 100 sites will be randomly selected for survey of Karner blue butterfly occupancy, and 50 of those 100 sites will be randomly selected to also be surveyed for Karner blue butterfly relative abundance.

Long-Term Potential Habitat (also referred to as "Permanency of Habitat" in the protocol):

1) 100 sites (plus eight alternates) surveyed for the presence/absence of the Karner blue butterflies from a known pool of 500 lupine sites.

2) 30 sites (plus six alternates) surveyed for Karner blue butterfly abundance.

In summary, of the known 500 lupine sites from those partners with long-term potential habitat, 100 sites will be randomly selected for Karner blue butterfly occupancy survey, and 30 sites of those 100 will be randomly selected to also be surveyed for abundance.

Survey sites will be stratified for sampling, both for analysis purposes and distribution among partners. The purpose of stratification is to reduce the variance in the overall estimate. By grouping the sampling pools by similarities, a more accurate estimate is generated. Survey sites within each conservation group will be distributed by ownership.

The apportionment of sites for survey responsibility will differ according to conservation strategy, yet will ensure some measure of equity in distribution of the workload among partners. For long-term habitat, each partner will be responsible, consistent with the protocol, for monitoring sites for Karner blue butterfly presence/absence and sites for Karner blue butterfly relative abundance. For shifting mosaic, the sites will be selected randomly from a pool, with each partner submitting a number of sites as a percentage of the total number required by that conservation strategy corresponding to percentage of land cover owned by that partner relative to the total.

Stratification of the sampling will initially occur only by the two major conservation strategies: (a) long-term habitat and (b) shifting mosaic. As the database from effectiveness monitoring is developed, the partnership may later opt for stratification by ecoregions (see Figure 2.3, page 21) as well. For any given sample size, it will take a longer period of time to draw statistically valid conclusions by conservation strategy or ecoregion than for the combined strata of high potential range.

c) Applying Adaptive Management

Adaptive management offers the potential for partners to have the flexibility necessary to meet their respective land management goals and for the Karner blue butterfly to have the dynamic landscape necessary for maintaining viable populations. Although specific criteria for identifying significant declines and eliciting response have not yet been developed, the partners agree upon the need for appropriate trigger points for changes to management activities and corresponding actions. To this end, the HCP partners intend to develop trigger points within one year of issuance of an ITP.

Adaptive management emphasizes the importance of developing a testable hypothesis that is linked to conservation strategies and biological objectives. For the partnership as a whole this can be simply stated as "maintaining Karner blue butterfly habitat and abundance at current levels by applying the combined sum of all partner and participant conservation efforts." This is what effectiveness monitoring will test.

Following any significant declines in a given strata, the partners will analyze sampling data. Patterns identified in this analysis may help determine the causes of the decline and the need for adaptive management. At a trigger point, partners have one of two options. They may choose to

immediately conduct or fund experimental, controlled research to assess whether their activities are a probable cause of the observed decline before adaptive management steps are taken. Alternatively, a partner may draw from recent literature and research to speculate on the cause of the decline and amend management practices accordingly. If downward trends continue, the monitoring regime should be intensified and management practices modified as appropriate based on an analysis by the Implementation Oversight Committee (IOC) or other appropriate committee. If the decline still persists, research should be conducted. In either case -- research as a first response or as a last -- partners associated with the decline will take responsibility for pursuing necessary research. Funding for such research may come from a variety of sources (see Part G of Chapter II, page 155).

In order to assess trends in Karner blue butterfly populations early in the monitoring program, federal recovery site data will be compared to original baseline data for selected HCP monitoring sites. Recovery sites will be used as a reference to identify changes in Karner blue butterfly populations that are likely attributed to climate or other environmental characteristics, rather than to land management practices. With allowances for some greater gains in the rate of population growth, recovery sites would be used as a control. References for trends may be based on collecting sufficient data from HCP monitoring sites. Many years (five or more) of analysis would be required before meaningful analysis and comparison could take place with historical data.

3. Auditing - Assessment of Conservation Measures

In addition to the need to make biological and ecological assessments related to management activities, it will be similarly important to assess the status and conditions of the management strategies and management activities actually being used, and the degree to which partners comply with their individual conservation agreements. The "Surveying and Monitoring" section above addresses the biological and ecological needs. Management status is dealt with in this section.

In simple terms, conservation agreements say what partners will do, and *compliance audits* ask the question "Did we do what we said we would do?" There are two reasons this is valuable information for the adaptive management process: (1) annual reports validate that the management activities being assessed are the same in practice as intended, or are something other, and (2) compliance audits verify that partners are living up to the commitments made in their conservation agreements.

a) Annual Reports

Conservation efforts applied to address species and habitat is an element of annual reporting in each partner's conservation agreements. This mechanism provides data that can be considered in monitoring an adaptive management effort. In addition, should information for further clarification be deemed necessary to consider the effects of an adaptive management approach, the DNR has authority to request information identified in the conservation agreements.

Annual reports will be submitted to the DNR and shared with the Implementation Oversight Committee (IOC). The DNR, in consultation with the IOC, will develop annual summary reports to be submitted to the USFWS. These reports will be subject to Wisconsin's "open records" law.

The following text, excerpted from the conservation agreement template, details the information contained in annual reports:

8. ANNUAL REPORT.

a. The partner shall submit an annual report no later than March 1 following the calendar year which is the subject of the report. Each report shall include the following information:

a. The acreage of land subject to disturbance, land use or management activities;

b. The type of activity, including equipment or techniques used and location of the disturbance by section;

c. Surveys conducted for the lands subject to the activities and the person(s) conducting the activities consistent with this agreement and the HCP;

d. Results of absence/presence surveys for the Karner blue butterfly and associated species identified in this agreement;

e. Acres of habitat known for each species specified herein on the lands subject to the activity;

f. Conservation strategies as identified in the HCP used to address species and habitat on the lands by this partner;

g. Monitoring activities conducted during the calendar year;

h. Transfers or purchases, conveyance of, or anticipated transfers or purchases, or conveyance of land or management rights subject to this agreement in the high

potential range of the Karner blue butterfly, or other transactions regarding lands or management of land in the high potential range, including identification of the purchaser or transferee or proposed purchaser or transferee, or other person with an interest in the property, and address, location and occurrence of Karner blue butterflies (if known) except as provided under Paragraph 15; (also see Paragraph 15 regarding other notification involving land in Significant Population Areas);

i. Other information requested by the DNR prior to the report date which is identified in the HCP or is reasonably necessary for implementation of or compliance with the permit or otherwise offered by the partner; and

j. Public outreach and education activities conducted by the partner adequately describing the outreach and education effort e.g. publication, cooperation with other landowners, etc.

b) Auditing Partner Performance and Verifying Agreement Compliance

Audits of HCP partners will be individual evaluations of various aspects of partner performance under their conservation agreements. These audits are intended to provide information to those in need of assurance with respect to performance (i.e. the USFWS, the DNR, the HCP partnership and the general public).

The auditing procedures and processes described in this section are a DNR and partner process to monitor partner performance for the purposes already described and are separate from USFWS actions that may be taken relative to regulatory oversight in administration and enforcement of the permit pursuant to the federal ESA.

File and field audits will be conducted to verify partner compliance with conservation agreements. Auditing is required because the DNR must have a procedure to gather the evidence to show that the HCP is being implemented as written and that the DNR is in compliance with the Implementing Agreement. In addition, summaries of auditing results over time may provide useful insights for adaptive management.

c) Authority

Some of the most common types of audits are those made by regulatory agencies to evaluate the performance of organizations they are assigned to regulate. In this case, the regulatory agency is the USFWS, who by agreement of the HCP partnership has assigned the DNR as the administrator (not a regulator) and auditor.

The DNR, as the permittee, and the IOC will act on behalf of the public and the partnership in a fair and impartial manner to accurately assess the performance of those entering into conservation agreements. This serves two purposes:

- to assure objective reporting of the facts and
- to provide the partnership with the most credible representation of its efforts to those entrusting them with the well being of the Karner blue butterfly.

The basic right to conduct audits is derived from the signed conservation agreements and was approved by the partnership following participation by the USFWS in the HCP development process. The auditor will act within the provisions of the conservation agreements and any supplemental agreements reached after discussion with the partnership and the USFWS. The core concepts of this process are spelled out in this document and may be further addressed in individual conservation agreements. With the help and concurrence of the HCP partners, specific auditing processes and procedures will be designed by the HCP administrator (the DNR). The USFWS will continue to reserve the right to participate in audits and to approve the proposed auditing processes and procedures. The USFWS, as per the Implementing Agreement, will conduct audits of DNR properties.

d) Audit Structure and Philosophy of the Audit Program

The auditing program will be operated by the permit administrator (the DNR), and the lead auditor will be a full-time, permanent DNR employee who meets the qualifications necessary to perform the work properly. The auditor could be the HCP Coordinator or it could be another employee of the DNR who works with the partner in other state programs (e.g., the forest tax law program).

Specific protocols are not described in this section, retaining flexibility to consider existing successful protocols which could be adapted, such as the forest tax law audit process. Protocols, specific audit content and report formats for the audit system will be defined and submitted to the USFWS for review and approval by the first anniversary of ITP issuance.

The prevailing philosophy of auditing will be one of process improvement, with a secondary focus on oversight and enforcement. Reasonability and flexibility will be applied to assure corrective action, improved conservation and, ultimately, successful HCP implementation. This will be accomplished while providing for the most efficient use of resources. With this in mind, the following sequence of events will take place:

1) In advance of the audit, the auditor will review the partner's (a) most recent "annual report," (b) any past audit reports, (c) the partner's conservation agreement for information pertaining to planned activities and the expected status of lands being managed within the context of the HCP. The purpose of this review will be to prepare the auditor, improve efficiency and reduce the time required for audits.

2) In advance of the audit, the auditor will prepare an auditing plan describing the points to be audited and will notify the partner's agents who will be involved in or concerned with the audit. Audit content will be developed consistent with each partner's individual conservation agreement. Field inspection sites, when needed, will be added to the auditing procedure. The partner may be consulted in the selection of sites for inspection to assure sites subjected to recent management activity are included.

3) On the day of the audit, the auditor will verify the monitoring and management activity records and actual field site conditions with the assistance of the partner. The entire audit and field inspection are expected to take no more than eight hours to complete. Under special circumstances an audit may take more time, however.

Audit results will be reviewed by the IOC prior to any decisions regarding recommendations and remedies, including notification of any penalties, or the issuance of a final audit report to the USFWS. A partner that is to be audited may request that another partner be present to witness the audit and provide guidance during the audit. Participation by the third party partner is voluntary.

During the first year of the permit, auditing will consist of meeting with each partner, reviewing annual report and record keeping requirements and identifying the partners' agents responsible for reporting. This will be done in the spirit of information exchange and in preparation for the following year's audit.

e) Policies to be Observed during Auditing

Normally, audits will be conducted on a scheduled basis, with partners being given reasonable prior notice. Although not a requirement, the auditor will give the partner at least five working days notice under normal circumstances. This will allow all concerned to organize workloads and assign personnel, the partner to prepare needed information, and the auditor time to develop a plan for the day of the audit. In order to protect the Karner blue butterfly and the integrity of the ITP for all concerned, the DNR may conduct unscheduled audits without advance notice, if there is reason to believe infractions are knowingly being withheld or a conservation agreement is not being honored; this being consistent with the conservation agreements.

Where possible, the auditor will be expected to compare things as they are to some objective

standard of what they should be. This will reduce the need for subjective judgement and lessen opportunity for wide differences of opinion. The standards may be reasonably challenged (e.g., if a standard is widely accepted and/or agreed upon by the partners in general, a partner may *not* challenge a standard for the sake of procrastinating or avoiding judgement not in their favor). Auditors are expected to review the facts (outward symptoms) with those attending the audit, before closing the audit or leaving the premises. The facts should be agreed on before the item is entered into a report going to either the IOC or the USFWS. Disagreement between the auditor and partner will be subject to the conflict resolution process discussed on page 113.

It will be the responsibility of each partner to investigate major deficiencies and determine the cause. In his or her recommendations, the auditor will include proposals that such an investigation be made, but the auditor is not responsible, nor should the auditor interfere in the problem-solving process of the audited partner.

Having identified nonconformance in the audit process, the spirit of recommendations will be to encourage the partner to investigate the cause of the problem and take corrective action before the problem becomes a major infraction, thereby protecting the partner's or other's incidental take permit coverage. Upon notification of a non-conformance, a partner will have 60 days to research the problem and notify the DNR in writing of proposed corrective actions. The DNR will review the corrective action plan and consider what remedial action, if any, is in order.

Partners are advised to immediately consult with the DNR upon knowledge of a permit violation and not wait for the auditing process to identify the violation. Both the DNR and the USFWS believe that the benefits of self-reporting include more prompt remediation of any damage to the Karner blue butterfly and better insurance of continued permit coverage.

Advance notice and the rights of entry and departure by authorized USFWS and DNR personnel in their duties regarding the HCP and the auditing process are described in the individual conservation agreements between partners and the DNR.

The partner will keep file records on all lands under his/her control that are specified as applicable to the HCP and conservation agreement. All of the records will be available for inspection by the DNR during the auditing process. Actual file information (including photocopies) may not be removed from the partner's office without written consent. However, DNR findings regarding the partners' degree of compliance with conservation agreements and information needed to summarize results over time to indicate changes in Karner blue butterfly abundance and distribution will be public information.

The DNR will conduct field audits as appropriate to verify partner compliance with the conservation agreements. The factual discrepancies between findings in the field and conditions reported in the office data will become part of the audit report only after agreement by the auditor and the partner on the verification of the facts. Nonconformance findings on specific tracts will

be reported in adequate detail for decision makers to weigh the consequences. In light of the fact that much of the information reviewed in the audit process will be held by the partner, the content of which will become public information, the DNR will be sensitive to partners' needs for confidentiality for competitive business reasons.

f) Frequency of Audits

Audits will be performed on an annual basis for at least the first three years by the DNR or the partner, however not if premature, nonessential, or no longer necessary, such as: prior to a planned action; where production of an outreach and education brochure is evidence the conservation measure was fulfilled; or where a one-time conservation measure, once implemented, has previously been verified. After the third year's review and as the auditor develops confidence in a partner's overall performance and ability to accurately monitor the results of prescribed actions and accurately describe and maintain records, the auditor may reduce the frequency of in-person audits. In place of a DNR audit, a partner could be asked to perform a self-audit and submit a progress or performance report, essentially following the audit procedure. However, the auditor will still initiate a periodic check to determine that the partner's staff continue to perform sound monitoring practices and make adequate assessments and decisions regarding the execution of the conservation agreement. This feature may also apply when no activity was planned since the last audit or when a partner's conservation measures have been previously satisfied.

The frequency of DNR "on-site/in-person" audits may be reduced under acceptable audit performance levels. If audit performance levels decline, the partner may return to standard audits, or a more frequent schedule as needed to assure corrective action. Also, audits may be reinstated if a partner has changes in involved staff. This provides the opportunity for interactive training to assure new staff understand what is expected. The order of partners to be audited will be determined by the most efficient scheduling sequence.

g) Subject Matter of Audits

The subject matter of audits will include a common set of standard audit characteristics and supplemental information especially tailored to the unique sets of activities and circumstances defined in the individual conservation agreements of each partner. The auditor's activities will be confined to matters pertaining to the HCP (i.e. records, species and lands of concern defined by the conservation agreement and any supplemental agreements, and objective standards for characteristics and criteria outlined in the HCP which apply to all partners). Audit checklists will be developed by the DNR in cooperation with each partner, and agreed on by the partner, the DNR and the USFWS.

A basic audit checklist will be developed, which will include such general characteristics as:

- review record keeping practices and file data, including maps showing lupine and Karner blue butterfly sites, as appropriate,
- review surveying and monitoring procedures and results,
- review qualifications of personnel keeping records and doing field surveying & monitoring,
- review conservation and management practices, and
- review outreach and education activities.

Others will be determined when the actual audit process is detailed. In addition to the basic audit characteristics above, the structure, process and performance requirements will be derived from each partner's conservation agreement. These will be added to the audit checklist. Field site inspections will also be added to the audit checklist for each audit; these will likely be different from audit to audit.

The qualifications of surveyors should be established prior to conducting any surveys. The Implementing Agreement states that DNR will "review credentials of any surveyor(s) under consideration to determine if qualified to undertake HCP actions for the protection and monitoring of the Karner blue butterfly." Partners will identify surveyors and their qualifications and ask the DNR to review the qualifications at various times (not necessarily during the audit). The USFWS will assist in the review process.

h) Review of Audit Results and Final Disposition

There are three fundamental objectives in reviewing the audits:

- to determine if the partner has complied with the terms of their conservation agreement,
- to build on management knowledge and understanding of the effects conservation activities have on the Karner blue butterfly and its habitat, and
- to improve on conservation results by improving our management processes through adaptive management.

The first objective is to assess partner compliance. The second objective is to share what is learned about the effects of conservation measures. This is particularly important to the partners. It is fundamental to adaptive management and is a significant benefit of this partnering approach. The third objective, corrective action and process improvement, will likely be the first and only prescription that will be applied in most cases of noncompliance. However when noncompliance is considered a significant or recurring breach of a partner's conservation agreement, additional remedies may be applied. A general process dealing with the disposition of noncompliant audit results of this severity is outlined in each conservation agreement under the title "Remedies."

i) Conflict Resolution Process

Audit results will be reviewed first by the auditor and the audited partner. They will attempt to agree on the facts found. When there is disagreement in observations, where possible, another person mutually agreed upon will be asked to make an observation on the discrepancy and offer an opinion. The third party will work with the auditor and partner being audited to insure reporting of the facts in an objective manner. Second, the Implementation Oversight Committee (IOC) will review all audit results and, if necessary, will hear the opinion of the partner in question and pass along its recommendation to the DNR.

If a major infraction or nonconformance is identified, after the partner presents a position to the IOC (including the DNR), and upon review and consideration by the advisory IOC, one of three things may happen:

1) If the Partner prior to the audit, identified, and in good faith took the initiative to notify the DNR of the problem, and/or if corrective action, which would correct the problem, has already been established or has previously been initiated and will be in place within an acceptable period of time, the IOC may recommend to the DNR that the ITP coverage remain in force. A combination of progressive corrective action, mitigation and/or damages may be assessed. (Refer to conservation agreements, "remedies" for a specific description of remedies.)

2) The ITP coverage may be suspended, pending review by the IOC, and a decision by the DNR regarding the recommended consequences.

3) The ITP coverage may be lost and action for breach of contract may be pursued by the DNR.

In addition, any decisions by the DNR do not bind or constitute a waiver of any action or authority that the USFWS has or may apply under the ESA, including enforcement actions.

j) Implementation Audit Report to USFWS

The final audit report including corrective action (where recommended by IOC or required by DNR) or damages, will be sent to the partner and the USFWS, and will be kept on record in the DNR's Bureau of Endangered Resources as public information.

Under no circumstances will a final report be issued to the USFWS until the IOC has had the opportunity to review and comment on the report. However, the DNR is required to notify

the USFWS promptly of any suspected violation resulting in the take of Karner blue butterflies. The implementing agreement provides a protocol for reporting suspected violations.

4. Research

This section briefly describes the role of research in the Wisconsin Karner Blue Butterfly HCP. It outlines research currently being conducted and objectives, topics and priorities for future research. It also describes a research program partners have agreed to and the process for coordinating proposals for research not identified in the HCP.

a) Recent and Current Research

Several Karner blue butterfly research efforts are already underway or have recently been completed. Some of these activities are discussed here, since the HCP partners will benefit from the work being done as results are made available. Only a summary of each activity is provided.

Herbicide Research. Forest harvesting operations on sandy sites in central Wisconsin often create conditions favorable for wild lupine and various nectar plants used by the Karner blue butterfly. A typical silvicultural management regime on these sites includes establishment of red pine plantations and release using herbicides to ensure adequate growth and survival of crop trees. Herbicide applications may effect the quality and extent of Karner blue butterfly habitat by impacting some life stage of the butterfly or the plants it requires for larval feeding and adult nectar. Observations by field foresters suggest herbicide release may be compatible with maintaining or improving Karner blue butterfly habitat, but little or no data have been available to substantiate this.

A research program was designed to document the effects of herbicide application on Karner blue butterfly eggs and habitat. The research consists of several sub-studies each designed to assess specific impacts of herbicide on Karner blue butterflies or Karner blue butterfly habitat components. The full compliment of sub-studies is designed to provide data on herbicide effects and mechanisms of action. Not all of the sub-studies are completed so the entire picture of herbicide impacts is currently unavailable. However, some key findings have been made and their relationship to conservation of Karner blue butterfly can be discussed.

Several herbicides and herbicide mixtures were studied; active ingredients tested included glyphosate, sulfmeturon methyl and triclopyr -- all with Entry II used as a surfactant. All herbicides, surfactants and herbicide mixes tested were representative of typical products and rates used in red pine release operations. Herbicide applications tested were all late-season (after August 15th), after lupine had senesced and most nectar plants had produced seed.

The comprehensive and thorough design of this research program is providing results that should enable the development of refined guidelines for herbicide application. The results and conclusions presented here are for informational purposes and should be considered *preliminary* as several components of the research program are still being completed and final results still must be analyzed. HCP participants will continue to gather, refine and synthesize information to help make adaptive management decisions. The HCP partnership will examine the entire research results and apply them to its herbicide use program as appropriate.

These studies are being conducted by Dr. Ed Sucoff of the University of Minnesota and Dr. Tom Nichols of the Forest Vegetation Management Cooperative, Cloquet Forestry Center. The studies are funded by the National Fish and Wildlife Foundation, the National Council For Air and Stream Improvement, the Wisconsin DATCP, Consolidated Papers, Inc. and Georgia-Pacific Corp.

Study I. Effects of Herbicides on the Development of Karner Blue Butterfly Eggs and Larvae Development

This study was designed to reveal any possible direct toxicity of herbicides to Karner blue butterfly eggs. Several herbicides and herbicide mixtures were studied to determine their impacts on hatching and development of Karner blue butterfly eggs and larvae development. Water only treatments were used as controls. Two years of tests were conducted, each using different spray coverage and herbicide mixtures. Response variables measured included percent of eggs hatching, time to egg hatching, percent of hatched eggs that pupated, time to pupation, percent of pupae that emerged as adults, rate of emergence and size of larvae immediately prior to pupation.

Results indicate that specific to the herbicides tested and Entry II surfactant that direct herbicide toxicity to Karner blue butterflies should not be a problem. Only one of the many herbicide mixes tested showed a statistically significant reduction in hatching or number of adults produced from eggs. And even this mix only showed what appeared to be mild toxicity even with complete coverage of the eggs with herbicide.

Study II. Effects of Herbicide on Seed Germination and Development

Experiments I and II. - These experiments were designed to determine the effects of herbicide on seed germination and germinant development of lupine and select nectar plants. Laboratory testing, following the protocols of the Association of Official Seed Analysts, were used. The study was not intended to replicate the impacts of operational spraying, but was designed to examine the impacts of complete seed coverage with herbicide and provide information on the mechanisms working in operational herbicide tests.

Experiments III and IV. - These experiments were designed to address the question "Will herbicides applied to seed which are still on the plant at the time of herbicide application effect germination or germinant development?" Spray treatments reflected operational spraying; after spraying, however, seed was removed and tested in laboratory conditions.

Results - The results of experiments I and II suggested that complete herbicide coverage may negatively impact either germination or germinant development of seeds tested. The results of experiment III and IV indicated that the operational spray treatment did not inhibit germination or germinant development. The combined results indicate that while herbicide has the potential to reduce seed germination rates or number of total healthy germinates, operational spray treatments may not show this result. The combined results do not clearly define the actual response that will occur under in-field operational conditions (discussed below) but they will aid in understanding those findings.

Study III. Effects of Herbicide Application on Lupine and Select Nectar Plants

Experiment I - This experiment was designed to: (1) determine the toxicity of operational rates of herbicide to lupine and select nectar plants and (2) determine the changes in populations of lupine and nectar plants in response to herbicide. The rates and herbicides used were typical of operational treatments however, spray distribution, droplet size and the amount of seed stored in the seed bank may not represent typical in-field operational spray conditions. Measurements from this experiment and analyses of data are still being conducted.

Experiment II. - This experiment was designed to determine the impacts of operational spray treatments on nectar plants and lupine. A typical treatment control design was used to compare treated and untreated plots. This experiment is still ongoing and will continue for several more years.

Results - The preliminary results of these experiments indicate that herbicide treatments one and two years after treatment have no affect on lupine stem number or percent cover. Results for nectar plants show a wide variety of responses to herbicide treatment depending on species. Some species show a sudden increase, probably due to reduced competition from other species. Others show an initial reduction followed by a gradual increase in number and/or coverage.

Discussion - Land management activities which set back succession, whether they are designed specifically to enhance habitat for a wildlife species or produce other outputs, have the potential to impact the habitat of flora and fauna depending on the severity and extent of the arrest of succession. For instance, spring fires have been proposed to be a common occurrence in the maintenance of barrens habitats. These fires though have the potential to be detrimental to Karner blue butterflies by causing direct egg mortality and by altering lupine phenology and flower abundance (Swengel 1996a). Other methods of stalling succession such as mowing and herbicide use may have less dramatic impacts on extant populations, but without repeated application these management practices may not have the lasting effects of more severe treatments. However, when these treatments are applied in rotation across the landscape the potential for providing a variety of successional stages exists.

When considering the tradeoffs of selecting between available management options, landowners must consider which management alternatives will meet their objectives and the conservation benefits provided to Karner blue butterflies. Properly timed and formulated herbicide treatments appear to provide an opportunity to limit succession without significant direct impacts to Karner blue butterflies or lupine.

Preliminary Conclusions - While all of the studies and analyses are not complete, some important preliminary conclusions can be made. The results provide valuable information for designing herbicide applications for use in and around potential and occupied Karner butterfly habitat. The results are only applicable to the tested herbicides and surfactant.

1) Herbicides will likely not cause direct toxicity to Karner blue butterflies if applied to occupied habitat.

2) Lupine plant abundance and flowering are not impacted by tested herbicides.

3) Herbicide applications carefully designed and timed after lupine senescence can have a neutral or positive impact on Karner blue butterflies and lupine.

4) The impacts of herbicides to nectar plant abundance and diversity are not yet well understood. As Karner blue butterflies develop from larvae to adult they change from a niche specialist to a niche generalist with respect to feeding substrate needs. Karner blue butterflies are known to nectar on a wide variety of flowering herbaceous plants and may be able to meet some nutritional needs from sources such as dung or dead animals. This makes understanding impacts of observed changes in nectar plants on habitat quality for Karner blue butterflies difficult.

Dispersal Research. A dispersal study is being conducted in Portage and Waupaca counties in east central Wisconsin to look at movement of adult Karner blue butterflies across distances greater than 150 meters in a closed canopy landscape. The research focuses on openings with lupine surrounded by oak forest and pine plantation. Initially, clearings were created amidst the closed forested landscape, affecting the release of existing lupine patches.

More recently, lupine has been planted in some of the openings. Oak wilt near existing inhabited lupine has created changes in the mixture and distances of open and closed habitat. Preliminary results have shown a wide variability in yearly data on the number of Karner blue butterflies dispersing into the openings with implications for the use of such openings relative to other variables such as climatic conditions and surrounding habitat availability. The study will contribute to the growing body of knowledge regarding dispersal capabilities of Karner blue butterflies through closed canopy habitats.

Spatial Patterning of Lupine. In 1995, research was funded by a grant from the National Biological Service to the DNR to further knowledge on dispersal abilities of Karner blue butterflies on forested landscapes. Unavailability of suitable habitat for direct experimental research into Karner blue butterfly dispersal in Jackson County, Wisconsin led the researcher to investigate spatial patterning of lupine and Karner blue butterflies, which suggests, indirectly,

abilities of lupine and Karner blue butterflies to disperse across this type of landscape.

Research was conducted on three large areas of managed forest totaling about nine square kilometers on the Black River State and Jackson County Forests, during the summer of 1995. The principal investigator was Thomas Celebrezze, a University of Wisconsin graduate student. See Celebrezze (1996) for complete results of this study.

Celebrezze found that Karner blue butterfly patches were more widely spaced than lupine patches. Karner blue butterfly presence probability peaked at approximately 500 meters from other Karner blue butterfly sites. These results suggest that Karner blue butterfly dispersal abilities may not be limiting on this landscape. However, lupine persistence and dispersal may be limiting. Data suggested very slow lupine colonization of potential habitat (only about 0.5-2 meters per year). Lupine persistence was highest in oak and jack pine dominated stands. It was present in younger red pine stands, but appeared to decrease in abundance by nearly 60 percent within 30-50 years after planting.

Celebrezze recommended that forest management for Karner blue may require a combination of lupine seeding and disturbance regimes to offset the low dispersal rate of lupine and its absence from suitable habitat today. Without active disturbance/seeding regimes, lupine may be undergoing gradual elimination due to a very slow reinvasion rate following local extirpation. Lupine was absent from many apparently suitable habitat areas, possibly due to historical farming, dense sedge mat, canopy closure and lack of appropriate disturbance. Celebrezze also suggested that red pine management with consideration for the Karner blue butterfly should involve thinning after 30 years to maintain existing lupine and planting lupine seed at the same time red pine is planted.

b) Proposed Research Pending

Timber harvesting and regeneration areas represent major landscape level disturbances across the HCP domain. The diversity of successional stages arising after timber harvest is potentially beneficial to the Karner blue butterfly and its larval host plant, wild lupine (*Lupinus perennis*), which thrive in mid-successional habitats (Grundel, *et al.* 1998). However, this shifting mosaic of successional states presents a management challenge as well. For example, areas regenerating after logging might become excellent habitat for the Karner blue butterfly after a timber harvest. Several years later, however, succession can make that same area unsuitable for either the lupine or the butterfly. When this same pattern is repeated in stands across the landscape it can be difficult to ensure that recolonization by lupines and Karner blue butterflies occurs on newly suitable areas. Additionally, the typical non-plantation logged forest in the HCP area presents a mixture of tree types: pines, oaks and aspen; and variety of harvesting protocols. The resulting complex interaction among succession, natural biological diversity and anthropogenic

disturbances means that best timber management practices for Karner blue butterfly conservation are easily obscured. This proposal, titled, "The effects of timber harvest regime on the distribution of *Lupinus perennis* (wild lupine) and *Lycaeides melissa samuelis* (Karner blue butterfly)," investigates several aspects of that interaction to offer foresters the option of improved techniques for combining timber harvest with conservation.

This proposed research is a limited attempt to relate forestry practices to lupine and Karner blue butterfly distribution and abundance. Forest growth obviously has a strong temporal component. The definitive way to understand how forest practice affects lupine and butterflies is to describe stands in detail, examine stands for lupine and Karner blue butterflies, perform the management actions, record precise details on those actions, and then, at regular intervals, return to the stands and record how the stand, the lupine and the Karner blue butterfly respond. This proposal is more limited. The research perspective will be a retrospective study that relates recent forest reconnaissance data to recent surveys of lupine and Karner blue butterflies. Although the forest reconnaissance database includes many variables useful to foresters, it does not include information on many of the factors related to the success of lupine and Karner blue butterflies. Therefore, this study proposes to examine whether forest reconnaissance information readily available to foresters in Wisconsin can help those foresters better manage their areas for Karner blue butterfly conservation.

The proposed research would utilize data from Fort McCoy Military Reservation near Sparta, Monroe County in central Wisconsin. The research was pursued by the DNR in response the HCP Biological Team's listing of priority research needs. The research will be performed by the U.S. Geological Survey, Biological Resources Division, Lake Michigan Ecological Research Station at Indiana Dunes, Porter, Indiana. The primary researchers will be Ralph Grundel, Ph.D. and Noel B. Pavlovic, Ph.D. working in cooperation with U.S. Army personnel. Funding is provided by the U.S. Geological Survey, Biological Resources Division. Data acquisition and manipulation began in the fall of 1998. A report should be available in about 18 months.

In addition, Northern States Power Company is undertaking research to asses potential impacts of ROW management on Karner blue butterflies. This research was started in 1998 and is expected to take at least three years. Mowing, hand cutting, herbicide applications and various combinations of the three techniques will be evaluated (Pamela Rasmussen, Northern States Power Co., pers. comm.).

c) Objectives for Future Research

Additional research will be necessary for a variety of reasons. In the adaptive management context in which the Wisconsin Karner Blue Butterfly HCP will be implemented, research will meet the following objectives:

- ☞ To obtain information needed to assess and improve effectiveness of conservation strategies.

- ☞ To obtain information needed to improve efficiencies and cost effectiveness of management activities, thereby reducing the costs of conservation and increasing participation.

- ☞ To obtain information needed to identify additional, viable management options to improve conservation effectiveness and cost effectiveness.

Research results will be routinely shared with all HCP partners.

Topics for Future Research. Research topics and activities were identified by the HCP partners and participants as information not available concerning the Karner blue butterfly. A list of these topics is included in Table 2.16 (page 122).

Table 2.16. Research Topics Identified by HCP Partners and Participants

Biological Research Specific to Forested Lands
- Association between Karner blue butterfly habitat and Kotar's Habitat Types
- Longevity and viability of Karner blue butterflies along roads and trails
- Longevity and viability of Karner blue butterflies in pine stands
- Pine-release procedures on lupine
- Stand density effects on lupine persistence
- Tree species effects on lupine persistence and regeneration
- Tree species and stand density considerations

Biological Research Specific to ROWs
- Impacts of management activities on ROWs
- Potential of connected ROW corridors

Disturbance - Landscape Scale
- Buffering Karner blue butterfly populations against catastrophic disturbance
- Stand size and rotation length effects on Karner blue butterfly habitat
- Stand species, density and configuration effects on butterfly dispersal

Disturbance - Stand Scale
- Effects of canopy opening on habitat suitability
- Effects of timing of disturbance on habitat suitability
- Mechanical and chemical disturbance effects (direct) on Karner blue butterflies
- Repeated mechanical and chemical disturbance effects
- Site characteristics from mechanical and chemical disturbance

Habitat Characteristics
- Characteristics that define "potential habitat" (landscape scale)
- Karner blue butterfly habitat characterization (site specific)

Karner Blue Butterfly Population Levels, Structure and Distribution
- Distribution patterns of Karner blue butterflies
- Karner blue butterfly *population* distribution
- Long-term variability of Karner blue butterfly populations/cycles
- Winter/Spring effects on Karner blue butterfly population levels

Land Management Impacts
- Effects of all land management activities on Karner blues and associated species
- Determine what constitutes permanent take
- Effects of pesticide use on Karner blue butterflies and associated species
- Karner blue butterfly egg strength
- Past Management activities at Crex Meadows

Lupine Research
- Methods to control exotics
- Viability of lupine seed/rootstock over time and under various shade conditions

Monitoring
- Determine best methods of monitoring Karner blue butterflies
- Monitoring Karner blue butterfly populations

Other
- Identify associated species that could become listed
- Review standards of endangered listing

Relocation
- Karner blue butterfly relocation strategies

Socio-Economic Research
- Landowner survey in potential range
- Social and economic consequences of conservation
- Socio-economic implications of listed species

Research Priorities. The research activities listed in Table 2.16 (page 122) were reviewed by the HCP Partnership's Biological Team. Team members developed a number of criteria for ranking

these activities. These criteria, determined to be important for the development of the HCP, include:

- the timeliness of the research,
- the adaptive management orientation of the research,
- the relationship of the research activity to HCP partners' responsibility,
- the practicality of the research practical, and
- the potential detrimental physical impact of the research on the Karner blue butterfly.

Research activities listed in Table 2.17 (below) were ranked as the highest priority research items within their respective category. The HCP partners will use the list of priorities to assist in guiding future research opportunities as they occur.

Table 2.17. Highest Priority Research Activities

Biological Research Specific to Forested Lands
Longevity and viability of Karner blue butterflies in pine stands
Stand density effect on lupine persistence
Longevity and viability of Karner blue butterflies along roads and trails
Pine-release procedures on lupine
Biological Research Specific to ROWs
Impacts of management activities on ROWs
Disturbance - Landscape Scale
Stand size and rotation length effects on habitat
Disturbance - Stand Scale
Effect of timing of disturbance
Mechanical and chemical disturbance effects (direct)
Effect of canopy opening to habitat suitability
Monitoring
Determine best methods of monitoring Karner blue butterflies
Monitoring Karner blue butterfly populations

Research Program. Observation and analyses of monitoring data by professionals at DNR and among partners will fuel the adaptive management process. The HCP is fortunate to be the benefactor of research already being pursued or planned by other parties. Other research that may be beneficial will be pursued as its priority becomes more important and as funding becomes available. The HCP partnership will not take the lead on research that does not benefit HCP implementation efforts; additional research is not being committed to by the partners at this time. Where HCP partners' research responsibilities may be complementary to the USFWS's federal recovery responsibilities, the initiation and pursuit of research may depend on federal financial support or research cooperation.

Coordination of Research Proposals. Partners who wish to engage in research that may result in take of the Karner blue butterfly and which is not specifically described in the HCP will coordinate with the DNR and the USFWS to obtain approval and authorization of the research activity. Coordination will proceed as follows:

1. A research proposal will be provided to the USFWS's Green Bay Field Office and to the DNR at least 45 days prior to conducting the work. The proposal will include the following information:

    - ☞ a brief description of the project,
    - ☞ explanation of the relationship of the project to the HCP,
    - ☞ explanation of the study purpose, objective and sampling design,
    - ☞ a list of researchers involved in the project (including names of all individuals working on the project),
    - ☞ description of qualifications and/or expertise of those conducting the work,
    - ☞ anticipated start date and duration of the research,
    - ☞ estimated level of take of the Karner blue butterfly associated with the project,
    - ☞ identified measures to reduce injury and death of Karner blue butterflies, and
    - ☞ information on how the research results will be used, published and disseminated.

2. The USFWS will coordinate with DNR and the researcher, as appropriate, on the proposed activities ensuring that the work will minimize harm to the Karner blue butterfly, yet achieve the goals of the project.

3. Upon approval of the activity by the DNR and the USFWS, the USFWS will authorize the work via a letter to the researcher. The project may proceed upon receipt of the USFWS's authorization letter, which will constitute the authority to proceed with the work under coverage of the ITP.